



TECHNICAL REPORT

TR 052

February 2017

**RECOMMENDATIONS FOR JOB-
SITE TESTS OF POWDER-
ACTUATED FASTENERS FOR
ETICS FOR USE IN CONCRETE**

Contents

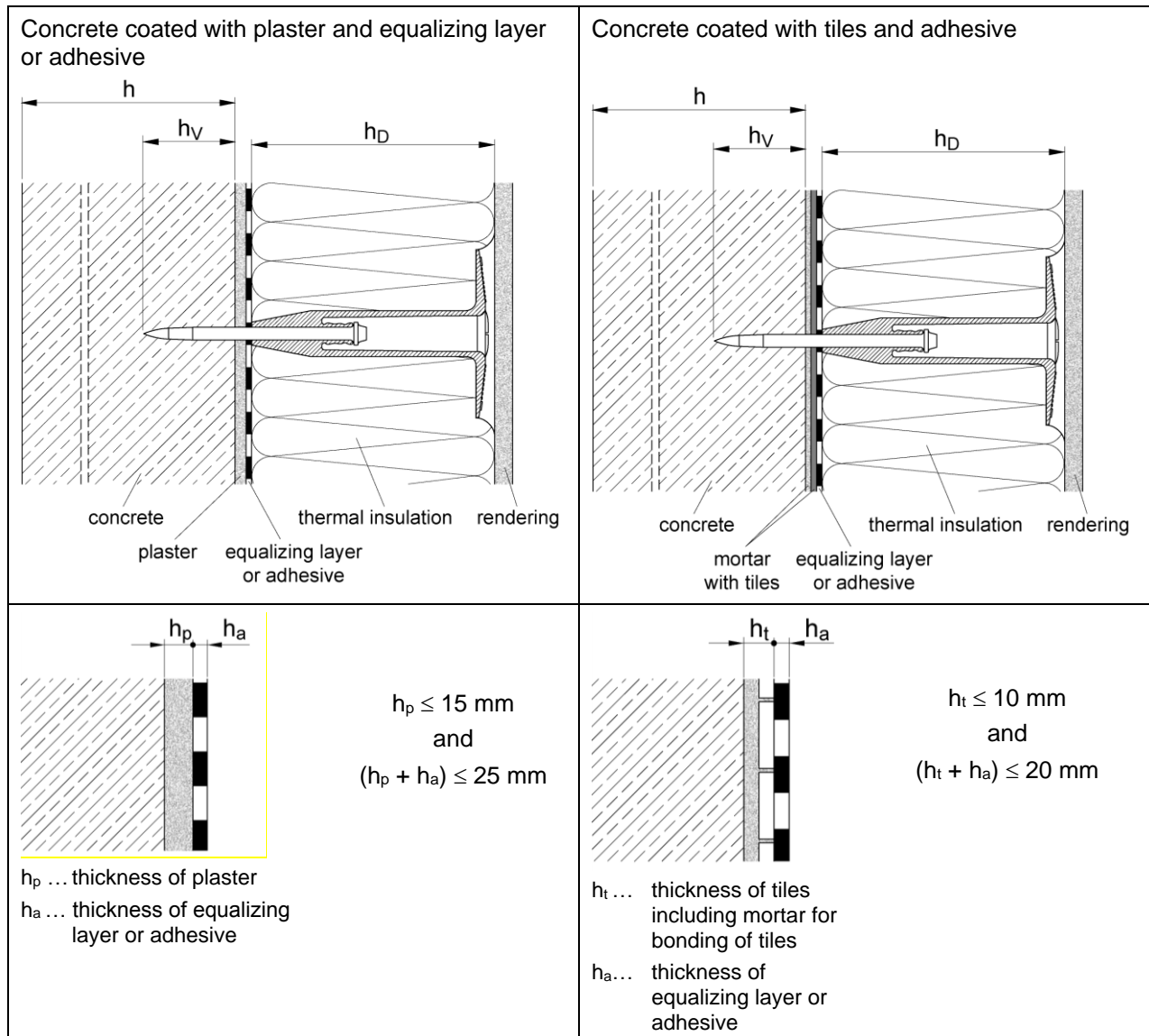
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1 GENERAL

The recommendations in this Technical Report (TR) are applicable for powder-actuated fasteners with a European Technical Assessment (ETA) on basis of EAD 330965-00-0601 [1].

Job-site tests for the determination of the characteristic resistance of the fixing element for pull-out failure may be done in case of concrete coated with plaster if the actual plaster specification is unknown or deviates from the plaster specified in the ETA. Job-site tests may also be done if the concrete is coated with tiles.

The following intended use conditions are to be observed.



The characteristic resistance to be applied to the fixing element (plastic part and powder-actuated fastener) shall be determined by means of at least 15 tension tests carried out on the construction works with a centric tension load acting on the fixing element.

Execution and evaluation of the tests as well as issue of the test report and determination of the characteristic resistance should be under the responsibility of competent and experienced testing laboratories or supervised by the person responsible for the execution of works on site.

The number and position of the fixing elements to be tested shall be adapted to the relevant special conditions of the construction works in question and, for example, in the case of blind and larger areas be increased such that reliable information about the characteristic resistance of the fixing element embedded in the base material in question can be derived. The tests shall take account of the most unfavourable conditions of practical execution.

2 ASSEMBLY

The fixing element to be tested shall be installed into the coated concrete (without equalizing layer or adhesive) with or without insulation and as far as spacing and edge distances are concerned be distributed in the same way as foreseen for the fixing of the external thermal insulation composite system.

The fasteners shall be installed according to the manufacturer's installation instructions using the approved fastening tool, fastener guide, piston and cartridges used in the specific project. When applicable, the insulation material has to be removed carefully before the test rig is attached to the fixing element. Cartridges and tool energy settings are to be selected that a mean anchorage depth $h_v \geq 20$ mm is achieved. The minimum anchorage depth of individual fasteners amounts to 18 mm.

3 EXECUTION OF TESTS

The test rig used for the tension tests shall allow a continuous slow increase of load controlled by a calibrated load cell. The load shall act perpendicularly to the surface of the base material and be transmitted to the fixing element via a hinge. The load can either be introduced via the plate of the plastic part or directly via the nail head of the powder-actuated fastener. In the latter case, the plastic part needs to be removed carefully before the test rig is attached to the fastener. The reaction forces shall be transmitted to the base material at a distance of at least 15 cm from the fixing element. The load shall be continuously increased so that the ultimate load is achieved after about 1 minute. Recording of load is carried out until the ultimate load is achieved.

4 TEST REPORT

The test report should include all information necessary to assess the resistance of the powder-actuated fastener. It shall be included in the construction dossier. The following information is necessary, e.g:

- Building project, date and place of tests, air temperature; type of structure (ETICS or VETURE Kits) to be fixed
- Type and thickness of coating: Plaster or tiles
- Type and thickness of insulation
- Type of fixing element
- Type of powder-actuated fastening tool, cartridge and tool energy setting
- Results of tests including indication of anchorage depth and of ultimate load
- Mode of failure: Typical modes are pull-out of the fastener from the concrete, fracture of the plastic part or excessive deformation of the plastic part.
- Test rig
- Tests carried out or supervised by; Signature

5 EVALUATION OF TEST RESULTS

The characteristic resistance for pull-out failure $N_{Rk,p}$ is obtained from the measured values of $N_{u,m}$ as follows:

$$N_{Rk,p} = 0.6 \cdot N_{u,m} \leq N_{Rk,p,coated} \text{ (from ETA)}$$

$$N_{u,m} = \text{the mean value of the five smallest measured values at the ultimate load (either the failure in the job-site tests is controlled by pull-out failure of the fastener or failure of the plastic part)}$$

$$N_{Rk,p,coated} = \text{characteristic tension resistance for coated concrete given in the ETA}$$

The characteristic resistance $N_{Rk,p}$ obtained by the job-site tests is limited by the characteristic tension resistance for coated concrete given in the ETA.

For design the maximum partial safety factor (either for fastener pull-out or failure of the plastic part) needs to be applied independent of the observed mode of failures in the job-site tests.

6 REFERENCE DOCUMENTS

As far as no edition date is given in the list of standards thereafter, the standard in its current version at the time of issuing the European Technical Assessment is of relevance.

- [1] EAD 330965-00-0601
Powder-actuated fastener for the fixing of external thermal insulation composite systems in concrete